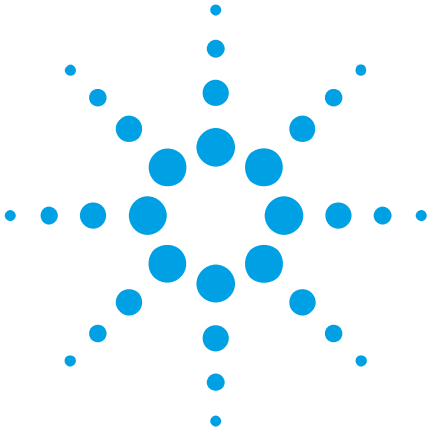

User Manual

Agilent Acqiris

10-bit Digitizers

Models covered:

DC122 / DC152 U1062A

DC222 / DC252 / DC282 U1065A

Agilent Technologies

Manual Part Number

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Acqiris Product Line Information

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1. Out of the Box

1.1. Message to the User

Congratulations on having purchased an Agilent Technologies Acqiris data conversion product. Acqiris digitizers are high-speed data acquisition modules designed for capturing high frequency electronic signals. To get the most out of the products we recommend that you read this manual carefully. We trust the product you have purchased will meet with your expectations and provide you with a high quality solution to your data conversion applications.

1.2. Using this Manual

This guide assumes you are familiar with the operation of a personal computer (PC) running a Windows 2000/XP/Vista/7 (32/64) or other supported operating system. It also assumes you have a basic understanding of the principles of data acquisition using either a waveform digitizer or a digital oscilloscope.

The manual is divided into 5 separate sections. To understand the elements of operation for the module it is essential that you read them all.

Chapter 1 ***OUT OF THE BOX,*** describes what to do when you first receive your new Acqiris product. Special attention should be paid to sections on safety, packaging and product handling. Before installing your product please ensure that your system configuration matches or exceeds the requirements specified.

Chapter 2 ***INSTALLATION***, covers all elements of installation and performance verification. Before attempting to use your Acqiris product for actual measurements we strongly recommend that you read all sections of this chapter.

Chapter 3 ***PRODUCT DESCRIPTION***, provides a full description of all the functional elements of the digitizer.

For information necessary for writing your own software to control Acqiris products you should refer to the **Programmer's Guide** and the **Programmer's Reference Manual**.

1.3. Conventions Used in This Manual

The following conventions are used in this manual:

⚠ This icon to the left of text warns that an important point must be observed.

WARNING Denotes a warning, which advises you of precautions to take to avoid being electrically shocked.

CAUTION Denotes a caution, which advises you of precautions to take to avoid electrical, mechanical, or operational damages.

NOTE Denotes a note, which alerts you to important information.

Italic text denotes a warning, caution, or note.

Bold Italic text is used to emphasize an important point in the text or a note

`mono` text is used for sections of code, programming examples and operating system commands.

B,KB,MB,GB is for Byte, KiloByte = 1024 bytes, MegaByte = 1024*1024 bytes, GigaByte = 1024*1024*1024 bytes

1.4. Model Names

Agilent Technologies Inc. acquired Acqiris SA and its product lines in December 2006. Use the tables below to cross reference the legacy model name and new Agilent numbers. The legacy model name is what is used in the Acqiris applications and the API.

Agilent Model Number	Acqiris Model Name
U1062A-001	DC122
U1062A-002-2F5	DC152
U1062A-002-2FZ	DC152HZ
U1065A-001-FHF	DC222HF
U1065A-001-F50	DC222
U1065A-002-F50	DC252
U1065A-002-FHF	DC252HF
U1065A-004-F50	DC282
U1065A-004-FHZ	DC282HZ

1.5. Disclaimer and Safety

The 10-bit DC Series CompactPCI/PXI digitizers have been designed to operate inside a CompactPCI/PXI crate. The crate provides the modules with all needed power. Agilent does not recommend operation of the DC Series modules outside of a CompactPCI/PXI crate.

CAUTION: ***Do not exceed the maximum input voltage rating! The maximum input voltage for 50 Ω input impedance is ±5 V. The maximum input for 1 MΩ input impedance is ±300 V (dc + ac).***

1.6. Warning Regarding Medical Use

The Digitizer cards are not designed with components and testing procedures that would ensure a level of reliability suitable for use in treatment and diagnosis of humans. Applications of these cards involving medical or clinical treatment can create a potential for accidental injury caused by product failure, or by errors on the part of the user. These cards are ***not*** intended to be a substitute for any form of established process or equipment used to monitor or safeguard human health and safety in medical treatment.

WARNING: ***The modules discussed in this manual have not been designed for making direct measurements on the human body. Users who connect an Acqiris module to a human body do so at their own risk.***

1.7. Packaging and Handling

Your Digitizer is shipped with the following components:

- A compact disc in an Agilent Technologies paper CD envelope that includes
  - 10 product User Manuals in electronic form (8-bit Digitizers, 10-bit Digitizers, 12-bit Digitizers, Averagers, Analyzers, Signal Analyzers, Streamer Analyzers, Time-to-Digital Converters, 3-, 5-, and 8-slot CompactPCI Crates, and the 21-slot CompactPCI Crate),
  - 1 Programmer's Guide and 1 Programmer's Reference Manual,
  - device drivers with sample software for different operating systems, environments and languages,
  - the Analyzer Demo application, a demonstration program for the AC/SC Analyzer products,
  - the AcqirisLive application, a demonstration program for our digitizer and averager products,
  - the SSR Demo application, a demonstration program for the Acqiris AP235/AP240 Analyzers,
  - the APX01 Demo application, a demonstration program for the Acqiris AP101/AP201 Analyzers,
  - the TC Demo application, a demonstration program for the Acqiris TC840/TC842/TC890 Time-to-Digital Converters,
  - full installation procedures for use with Microsoft Windows, National Instruments LabVIEW RT, Wind River VxWorks, IVI-COM/C, and Linux software.

- A declaration of conformity
- Optional documentation such as a model-dependent document giving Specifications & Characteristics, a Calibration Certificate, or a Performance Verification

After carefully unpacking all items, inspect each to ensure there are no signs of visible damage. Also check that all the components received match those listed on the enclosed packing list. Agilent cannot accept responsibility for missing items unless we are notified promptly of any discrepancies. If any items are found to be missing or are received in a damaged condition please contact the Agilent service center or your local supplier immediately. Retain the box and packing materials for possible inspection and/or reshipment.

1.8. Warranty

All Agilent Acqiris Digitizer products are warranted to operate within specification, assuming normal use, for a period of at least one year from the date of shipment. Units sold before April 2008 had three year warranties, as do some more recent ones; in case of doubt examine your invoice. It is recommended that yearly factory calibration be made in order to verify product performance. All repairs, replacement and spare parts are warranted for a period of 3 months. Warranty extensions are available as an option.

Agilent endeavors to provide leading edge technology that includes the latest concepts in hardware and software design. As such software and firmware used with the products is under continual refinement and improvement. All software and instrument firmware is supplied “as is” with no warranty of any kind. Software and firmware is thoroughly tested and thought to be functional at the time of shipment. At Agilent’s discretion software and firmware may be revised if a significant operational malfunction is detected.

In exercising this warranty, Agilent will repair or replace any product returned to the Agilent service center, within the warranty period. The warranty covers all defects that are a result of workmanship or materials. This excludes defects that are caused by accident, misuse, neglect, or abnormal operation.

The purchaser is responsible for returning the goods to the nearest Agilent service center. This includes transportation costs and insurance. Agilent will return all warranty repairs with transportation prepaid.

1.9. Warranty and Repair Return Procedure, Assistance and Support

Agilent acquired Acqiris SA and its product lines in December 2006. Please contact your nearest Agilent Service Center before returning any product for repair.

You can find information about technical and professional services, product support, and equipment repair and service on the Web, see http://www.agilent.com/find/service (or http://www.agilent.com/ and after selecting your country click on **Contact Us**). The service center will ask for your name, company, phone number and address, the model and serial numbers of the unit to be repaired, and a brief description of the problem.

Before issuing a Service Order the service center may ask you to communicate with us by phone or eMail so that we can learn as much as needed about the problems observed. If a unit returned under guarantee is found to be working normally and this procedure was not followed we reserve the right to charge you for the work done.

For your nearest customer support center please contact Acqiris Technical Support (ACQIRIS_SUPPORT@agilent.com) or come visit our web site at http://www.agilent.com/find/acqiris. Alternatively, contact Acqiris at 1-800-829-4444 in the USA, +41 22 884 32 90 in Europe or +61 3 9210 2890 in the Asia-Pacific region. The Agilent Support Centers can also help redirect you for any questions concerning the installation and operation of your equipment.

1.10. Transport & Shipping

⚠ ***CAUTION: Cards can be safely transported in their original shipping packages. DC cards can be transported when properly mounted in a CompactPCI crate.***

To package the instrument for shipping:

Step	Notes
1. Place the instrument in its original packaging materials.	• If the original packaging materials are not available, use a professional packaging service. Contact your Agilent Service Center for more information.
2. Surround the instrument with at least 3 to 4 inches (8 to 10 cm) of its original packing material or bubble-pack to prevent the instrument from moving in its shipping container.	
3. After wrapping it with packing material, place the instrument in its original shipping container or a strong	• The shipping container must be large and strong enough to accommodate your instrument and allow at

shipping container that is made of double-walled corrugated cardboard with 159 kg (350 lb) bursting strength.

4. Seal the shipping container securely with strong nylon adhesive tape.

5. Mark the shipping container “FRAGILE, HANDLE WITH CARE” to help ensure careful handling.

6. Use the address obtained from your Agilent Service Center.

7. Retain copies of all shipping papers.

least 3 to 4 inches (8 to 10 cm) on all sides for packing material.

CAUTION: ***Damage can result if the original packaging materials are not used. Packaging materials should be anti-static and cushion the instrument on all sides. NEVER USE STYRENE PELLETS IN ANY SHAPE AS PACKAGING MATERIALS. They do not adequately cushion the instrument or prevent it from moving in the shipping container. Styrene pellets can also cause equipment damage by generating static electricity or by lodging in fan motors.***

1.11. Maintenance

The cards do not require any maintenance. There are no user serviceable parts inside. A periodic factory calibration can be obtained on request.

1.12. Cleaning

Cleaning procedures consist only of exterior cleaning.

Clean the exterior surfaces of the module with a dry lint-free cloth or a soft-bristle brush. If any dirt remains, wipe with a cloth moistened in a mild soap solution. Remove any soap residue by wiping with a cloth moistened with clear water. Do not use abrasive compounds on any parts.

1.13. Disposal and Recycling

Electronic equipment should be properly disposed of. Acqiris digitizers and their accessories must not be thrown out as normal waste. Separate collection is appropriate and may be required by law.

2. Installation

This chapter describes how to install the hardware and software for Windows and Linux.

⚠ ***NOTE:*** *For a first time installation we strongly recommend installing the software* ***before*** *inserting the hardware into the PC.*

2.1. System Requirements

The following table lists the system configurations that Agilent have tested, and are therefore guaranteed to work. In general, any x86 or x64 (except Itanium) processor should work, but there may be a decrease in performance.

Topic	System Requirements		
	Windows XP SP3	**Windows Vista®** SP1 and SP2, **Windows 7®** (32 or 64-bit), All versions.	**Linux** kernel 2.6 or higher (32 or 64-bit), Debian 6.0, CentOS 5
Processor speed	600 MHz or higher required 800 MHz recommended	1 GHz 32-bit (x86) or 64-bit (x64), no support for Itanium64	As per the minimum requirements of the chosen distribution.
Available memory	256 MB minimum (1 GB or greater recommended)	1 GB minimum	As per the minimum requirements of the chosen distribution.
Available disk space [1]	1.5 GB storage space, which includes: 1 GB available for Microsoft .NET Framework 3.5 SP1 [2]		100 MB
Video	SuperVGA (800x600) 256 colors or greater	Support for DirectX 9 graphics with 128 MB graphics memory recommended (SuperVGA graphics is supported)	Does not require graphics (headless system). X Windows with 1280x1024recommended for SFP
Browser	Microsoft Internet Explorer 6.0 or later	Microsoft Internet Explorer 7 or later	Distribution supplied browser

LabVIEW: Full driver implementations are available for National Instruments LabVIEW versions 8.5, 8.2.1, and 8.0. LabVIEW 7.1 is frozen at the level of Acqiris Software 3.2 with support for all instruments.

MATLAB: The MEX interface can be used with MathWorks MATLAB 7.3 or a newer version.

Visual C++: The interface files, projects and examples are available for Microsoft Visual Studio 2008 / C++.

2.2. Installing the Software under Windows

The software is located on the Agilent MD1 High-Speed Digitizer Software and Product Information CD (M9210-90007).This software is also available for download at the Agilent website www.agilent.com/find/Digitizers

For a first time installation on your computer Agilent recommends that you install the software BEFORE installing the hardware on your system. When upgrading to a new version, you should leave your modules installed and powered during installation. Administrator privileges will be needed for software and hardware installation. This includes the case of first-time installation of a module in a different crate slot.

It is good practice to remove any previously installed version of the same Agilent software. However if the installation program finds that there is a conflict with software already installed on your machine a warning panel will appear.

Installation procedure:

[1] Note: Less storage space may be required for operation than is required for installation due to the process.

[2] Note: .NET Framework Runtime components are installed by default with Windows Vista. Therefore, you may not need this amount of available storage space.

1. From the Agilent MD1 High-Speed Digitizer Software and Product Information CD (M9210-90007) launch the installer.

Agilent MD1 High-Speed Digitizer CD Resources
Agilent MD1
High-Speed Digitizers
Product Software and Information
Software Installation
1. Install the Agilent IO Libraries Suite first. The MD1 software requires Agilent IO Libraries Suite. If the Suite is not installed already, please install it from its respective CD (shipped with your product) or install it from the web at: www.agilent.com/find/iosuite
2. Install MD1 Software
MD1 Literature
Startup Guides
Data Sheets
Soft Front Panel help system
IVI Driver API help system
LabVIEW API help system
Declaration of Conformity
Online Resources
Agilent PXI Digitizers
Agilent Repair & Service
Agilent Digitizer Products
Other Agilent PXI Products
Other Agilent Modular Products
For the U1084A digitizer, click here:
U1084A Installation
(This will also support the U106x, U107x and U108x digitizers. The Agilent IO Libraries Suite is not required)
Browse the CD
Quit
Agilent Technologies
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2. The ‘U1084A Installation’ button provides the option to install the U10xx Digitizer products package to your PC. This includes Device drivers, Soft Front Panel applications and documentation for the Agilent Acqiris 8-Bit digitizer products which are covered by this manual.
3. After installation is complete, re-start the PC and install the hardware, or the chassis and the host PC if you are using a remote controller.

2.2.1. U10xx Digitizer Products Support

If the ‘U1084A Installation’ option has been selected during the installation process the following items will have been installed to your PC:

- **Drivers :** IVI-C, IVI-COM, and LabVIEW G for all modules.
- **Documentation** : A folder **..\Program Files\Agilent\U10xx_Digitizers\manuals** will be created.
- **Agilent MD1 Soft Front Panel 1.7** : This version specifically supports the U10xx Digitizer products and replaces the previous ‘AcqirisLive’ application, its functions and operation are virtually identical.
- **Examples :** For MatLab, C++, LabVIEW will be placed into the **..\Program Files\Agilent\U10xx_Digitizers** folder in the appropriate sub-folder.

2.3. Installing the Software for Linux

Please refer to the README file in the **/Linux** folder of the Software CD-ROM for detailed instructions on how to install the software for Linux systems.

2.4. Installing the Hardware

1. Turn off the power of the PC and the crate in the case of a CompactPCI module.

CAUTION: ***For PCI modules the PC may have to be unplugged to ensure that the PCI bus has no power available. However, CompactPCI crates can be left plugged in since this ensures proper grounding.***

CAUTION: ***Touch the antistatic package to a grounded object before removing the card from the package. Electrostatic discharge may damage the card.***

Be sure to ground yourself by touching the grounded frame and avoid touching any components on the card.

2. Module in a PC: open the PC, identify a free PCI slot and carefully insert the card into it. Make sure that the grounding of the card's mounting bracket to the back panel rail of the computer is done correctly. If present make sure that the fan's adjustable retainer is correctly positioned and tightened for mechanical support. Close the PC.

   Module in a CompactPCI crate: Follow the instructions of the crate manufacturer to insert the card into a free CompactPCI peripheral slot. Be sure to tighten both front panel mounting screws to lock the module into place and insure proper grounding of the frame.

NOTE: *To ensure the best possible performance, users of Agilent CC121 Crates with AS bus systems should respect the module placement rules to be found in the Agilent Acqiris 21-slot CompactPCI Crate User Manual.*

   PCI Bus extension module in a PC: Consult the manufacturer's documentation for any special instructions. Open the PC, identify a free PCI slot and carefully insert the card into it. Make sure that the grounding of the card's mounting bracket to the back panel rail of the computer is done correctly. Close the PC. Connect the module to the CompactPCI crate controller.

3. Turn on the power of the crate(s), if present, and then the PC and start the operating system.

NOTE: *Agilent Acqiris digitizers are equipped with a LED. If this LED is not glowing orange or red when the power is applied there is a severe problem. Either the module is broken or the necessary voltages for its use are not available.*

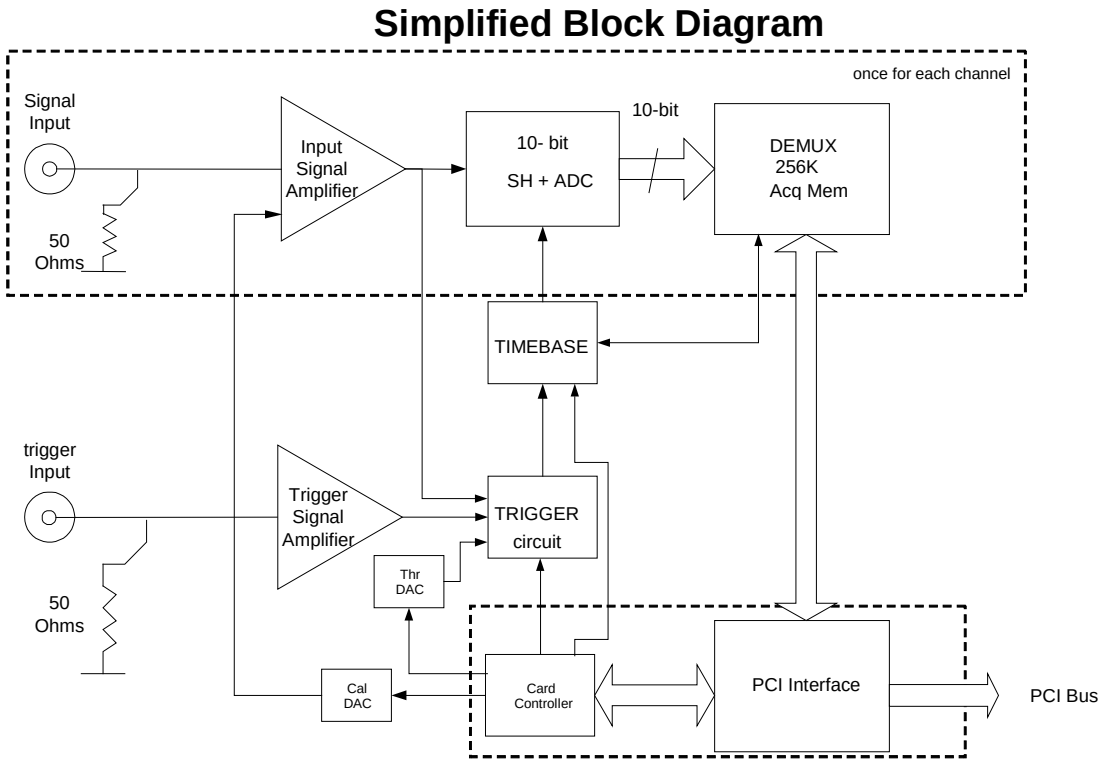
NOTE: *For proper system operation when using the IC200, IC414, or other PCI extension interface to connect a CC10X crate to a remote PC, the crate* ***must*** *be powered on before the PC in order for the PC BIOS to recognize the presence of the CompactPCI crate.*

2.5. Uninstalling devices under Windows

In the Device Manager, select the instrument to be uninstalled. Choose "Uninstall" from the "Action" menu. After all desired instruments have been uninstalled select "Scan for hardware changes" from the "Action" menu, or reboot the computer. Note that only those devices that are actually physically present are visible in the Device Manager.

3. Product Description

3.1. Overview



The 10-bit DC series products are CompactPCI/PXI compliant and require an appropriate CompactPCI crate. The digitizers are all fully programmable over the PCI bus and deliver oscilloscope-like performance. Data captured by the digitizers can be transferred to a host processor, either in the PC, in the crate, or interfaced to the crate, over the PCI bus. The 6U units (DC222, DC252, and DC282) can operate at 64-bit − 66 MHz with peak transfer speeds approaching 500 MB/s. The 3U units (DC122 and DC152) work at 32-bit − 33 MHz. The digitizers occupy a single slot of a 3U or 6U CompactPCI crate and they comply with the 3U or 6U CompactPCI standard (PXI compliant).

Acqiris digitizers are designed to provide superior measurement precision and accuracy. Key acquisition specifications (such as DC accuracy, integral and differential non-linearity) have been optimized to deliver maximum measurement fidelity. Careful circuit layout, custom IC's and special packaging techniques have all been employed to reduce overall system noise. The use of custom IC's also dramatically reduces the total number of discrete components required. This has tremendous benefits on reliability and also allows the modules to use a minimal amount of power.

For complete technical specifications concerning your particular digitizer please refer to the product's Specifications & Characteristics. In addition, we maintain up-to-date versions of all product data sheets on our web site (http://www.agilent.com/find/acqiris). The data sheets are available in pdf format and are best viewed using Adobe Acrobat software. If you have trouble accessing our web site, or viewing the data sheets, please contact your nearest sales office.

3.2. Channel Input

The 10-bit digitizer family can be configured with a variety of front-end mezzanine boards offering different capabilities. The currently available front end options are detailed below:

Front End Option	**Impedance**	**Bandwidth Guaranteed (typical) / Risetime**	**BW Limiter selections**	**FS Voltage Ranges**	**Maximum Offset / *Max. Voltage***
Standard **(Std)** F50	**50 Ω**	2 GHz 0.17 ns	20, 200, 700 MHz	0.05 – 5.0 V	± 5 V *± 5 V*
High-Impedance **(HZ)** FHZ	**50 Ω**	950 MHz (1 GHz) 0.35 ns	20, 200, 700 MHz	0.05 – 5.0 V	± 5 V *± 5 V*
	1 MΩ	(300 MHz) 1.2 ns	20, 200 MHz (see remark below)	0.05 – 50 V	± 20 V (> 0.5 V FS) ± 200 V (> 5V FS) *± 300 V*
High-Frequency **(HF)** FHF	**50 Ω**	3 GHz 0.12 ns		1 V	± 1.0 V *± 2 V*

A given unit's model number will indicate which front end option is installed. If nothing follows the number itself then the standard front end option is present.

Units can be ordered with BNC or SMA connectors.

For DC2x2HZ units and FS > 5 V, only the 20 MHz Bandwidth Limiter is available.

3.2.1. Standard & High Impedance Coupling

Both AC and DC coupling modes are available. The AC mode couples signals capacitively thus removing the input signal's DC component and filtering out any signal component below 16 Hz for the HZ option or 32 Hz for the Std option. DC mode allows all signal components to be passed through to the digitizer.

3.2.2. Impedance

The input channels of the 10-bit digitizer Family offer termination in either 50 Ω or 1 MΩ. The 50 Ω coupling mode for the Standard and High-Impedance front ends, offers high quality termination with better than ± 1% precision. It is ideally suited to use with 50 Ω transmission lines (coax), high bandwidth low impedance (typically 500 Ω) probes or active probes. The HF 50 Ω coupling mode has ± 2% precision The 1 MΩ coupling mode provides a high impedance (low load) capability that is suited for use with most standard high impedance probes. The high impedance mode also features low (14 pF typical) capacitance that helps to minimize loading effects that can occur when probing high frequency circuits.

3.2.3. Input Protection

The input amplifiers are protected against over-voltage signals as shown in the table. The High-impedance limit refers to the input signal's DC + peak AC < 10 KHz voltage.

3.2.4. Mezzanine Front-end

The front-end electronics are all mounted on a removable mezzanine card. In the event of accidental damage or as components fatigue over time (e.g. relays in high duty cycle automated testing applications), the mezzanine card allows for fast and efficient replacement.

3.2.5. Bandwidth and Rise Time

The bandwidth specification indicates the frequency at which an input signal will be attenuated by 3 dB (approximately 30% loss of amplitude). The bandwidth also affects the minimum rise and fall times that can be passed through the front-end electronics. A pulse with a very sharp edge will be observed to have a minimum rise time (τ_{min}) determined by the front-end electronics. In general a pulse with a given 10-90% rise time ($\tau_{10\text{-}90real}$) will be observed with a slower value given by:

$$\tau_{10\text{-}90}^2 = \tau_{10\text{-}90real}^2 + \tau_{min}^2 \qquad \text{where} \quad \tau_{min}\,(\text{ns}) \approx 0.35\ (\text{GHz-ns}) / \text{BW}\ (\text{GHz})$$

For the HZ option in 1 MΩ coupling the 700 MHz Bandwidth Limiter cannot be used. Furthermore, for FS gain > 5V the 200 MHz Bandwidth Limiter is always active.

3.2.6. Input Voltage and Offset

The input channel provides a fully programmable amplifier with variable input voltage and offset. Full Scale (FS) input voltages are selectable in a 1, 2, 5 sequence for the range shown above. Care should be taken to select an input voltage range that will allow the signal to be recorded using as much dynamic range of the digitizer as possible. The Variable Offset is programmable in the range of ±2 V when using an FS Input Voltage setting of 500 mV or below, increasing to ± Maximum Offset for FS settings above 500 mV (see the preceding table). The raw 10-bit ADC data values are read as 16-bit integers in the range [-32768, +32704] with nominal steps of 64 LSB's between successive codes and the first and last values reserved for underflow and overflow respectively. The actual values returned use 12 bits and unequal spacing to correct for the measured DC integral non-linearity of each ADC involved. The midpoint value, 0, of the range corresponds to the negative of the offset voltage. Thus the Full Scale Range (FSR) goes from

–Offset Voltage **– (FS/2)** to –Offset Voltage **+ (FS/2)**

Signals going outside of the FSR will be clipped and data values for the clipped portion of a signal should be regarded as erroneous.

3.2.7. Vertical Resolution

The digitizers described in this manual use an ADC system with 10 bits of vertical resolution (1024 levels). The dynamic range of the ADC covers the Full Scale Range (FSR) of the Input Voltage setting. For example, if the Input Voltage is set to 1 V then the ADC resolution is equivalent to 0.977 mV. To obtain the best dynamic range from the ADC care should be taken to ensure that the input signal varies over more than 50% of the Input Voltage FSR setting.

3.2.8. DC Accuracy and Linearity

These 10-bit digitizers use low noise front-end electronics in order to ensure voltage measurement is made with accuracy and precision. DC voltage accuracy, at 0 V offset, is better than ±2% (±1% typical) of the input voltage full scale. The static differential nonlinearity is < 2 LSB. The integral linearity is good to ± 1 LSB (typical).

3.2.9. Using Probes

The 50 Ω and 1 MΩ input impedance settings make it possible to use Acqiris digitizers with a wide variety of probes. The 50 Ω setting is most commonly used for active probes and low impedance (500 Ω) passive probes. The 1 MΩ setting is normally used for high impedance probes. Before using any Passive Probe with a digitizer care should be taken to check that the probe has been correctly adjusted (refer to the Probe's Calibration procedure).

⚠ ***NOTE***: *Passive high impedance probes are not suitable for high fidelity measurements above 100 MHz. The non-negligible (5-10 pF) tip capacitance loads the signal causing distortion and/or ringing when combined with the ground lead inductance.*

3.3. Data Acquisition

The table below summarizes the characteristics discussed in the sections that follow:

Model Agilent #	**Max. Sampling Rate**	**Max. CONVERTERS PER CHANNEL/ CHANNELS**	**Default Memory Samples/ channel**	**Maximum Optional Memory Samples/ channel**	**Maximum Segments**
DC122 U1062A -001	4 GS/s	1 / 1	512K	512M	125K
DC152 U1062A -002	4 GS/s	2 / 2	256K	256M	125K
DC222 U1065A -001	8 GS/s	1 / 1	1024K	1G	125K
DC252 U1065A -002	8 GS/s	2 / 2	512K	512M	125K
DC282 U1065A -004	8 GS/s	4 / 4	256K	256M	125K

3.3.1. Sampling Rate

All Acqiris digitizers contain an analog-to-digital conversion (ADC) system that can sample waveforms, in a real time sampling mode, at rates from the maximum allowed rate down to 10 MS/s (100 ns per point). The sampling rate can be programmed and is selectable in a 1, 2, 2.5, 5 sequence (i.e. 10 MS/s, 20 MS/s, 25 MS/s, 50 MS/s, 100 MS/s, … 1 GS/s, 2GS/s, 4 GS/s, 8 GS/s). The maximum sampling rate shown above exploits the possibility of combining channels.

3.3.2. Acquisition Memory

Data from the ADC is stored in on-board acquisition memory. The amount of memory in use for acquisition can be programmed and is selectable from 1 point to the full amount of acquisition memory available.

For technical reasons, a certain acquisition memory “overhead” is required for each waveform, reducing the available memory by a small amount. In order to simplify programming, an interface function recommends the best sampling rate and the maximum possible number of data points, taking into account the available memory, the requested time window, the number of segments (in Sequence mode), as well as the required memory overhead.

To ensure maximum sampling rate and high timing resolution, we strongly recommend the use of long acquisition memories whenever possible.

Optional Memory is available on most models. It allows the maximum number of segments to be increased significantly. However, this memory is divided into 2K sample pages and a segment must start at the beginning of the page. Additional memory is used for segment time stamps. These constraints must be kept in mind when trying to understand how the driver limits the number of points as the number of segments changes. Furthermore, multi-segment event readout must read entire pages for each ADC. This can introduce significant overhead for small segments and/or when channels are combined. It should also be understood that the maximum theoretical transfer rate from the external memory to the cPCI bus is limited to 215 MS/s. For a 64-bit 66 MHz cPCI bus this leads to a real maximum transfer rate of ~400 MB/s in the 16-bit data mode and ~200 MB/s in the 8-bit data mode.

3.3.3. Single and Sequence Acquisition Modes

Digitizers acquire waveforms in association with triggers. Each waveform is made of a series of measured voltage values (sample points) that are made by the ADC at a uniform clock rate. The digitizer can also measure and store the arrival time of each trigger using the information from the on board Trigger Time Interpolator (TTI). Readout of

the individual trigger time stamps makes it possible to determine the time from one trigger to any other trigger. Time differences up to 213 days can be measured. The TTI resolution sets the resolution of the trigger time stamps (see section 3.3.5 ***TIMING***). To maximize sampling rates and utilize memory as efficiently as possible, the digitizers include both Single and Sequential storage modes. For both of these modes the data of all of the active channels is acquired synchronously; all of the ADC's are acquiring data at the same time, to within a small fraction of the maximum sampling rate.

The Single Acquisition mode is the normal operation of most digitizer products. In this mode an acquisition consists of a waveform recorded with a single trigger. The user selects the sampling rate and acquisition memory size and sets the number of segments to 1 (default value).

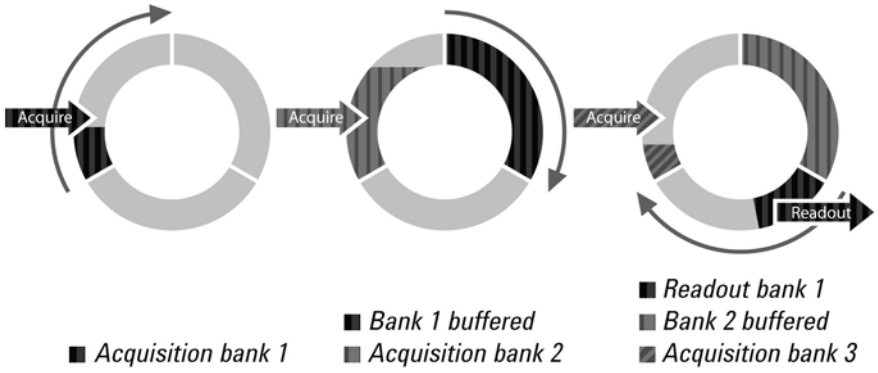
The Sequence Acquisition mode allows the capture and storage of consecutive "single" waveforms. Sequence Acquisition mode is useful as it can optimize the digitizer's sampling rate and memory requirements for applications where only portions of the signal being analyzed are important. The mode is extremely useful in almost all impulse-response type applications (RADAR, SONAR, LIDAR, Time-of-Flight, Ultrasonics, Medical and Biomedical Research, etc.).

In Sequence Acquisition mode the acquisition memory is divided into a pre-selected number of segments. Waveforms are stored in successive memory segments as they arrive. Each waveform requires its own individual trigger. The memory can be divided into any number of segments between 2 and 1000 (up to 16000 segments with the M32M option in a DC282 and 125000 segments with options M256M or greater). In Sequence Acquisition mode the user needs to specify the sampling rate, the total acquisition memory, and the number of segments. Note that the Single Acquisition mode is just a special case of the Sequence Acquisition mode with the number of segments set to 1.

Sequence acquisition enables successive events, which can occur within a very short time, to be captured and stored without loss. A crucial feature of Sequence Acquisition mode is that it has a very fast trigger rearm time. A fast trigger rearm helps produce very low "dead time" (< 350 ns for the highest available sampling rates using internal memory and < 1.8 µs for the highest available sampling rates with optional memory) between the segments of a sequence acquisition. The "dead time" is the period after the end of an event when the card cannot digitize data for a new trigger event.

3.3.4. Simultaneous multibuffer Acquisition and Readout (SAR)

The internal memory has a dual-port structure which can be exploited to permit simultaneous data acquisition and read out. The memory can be turned into a circular buffer of a chosen number of banks, between 2 and 1000. Data can be read out of one bank while data is acquired into any available free banks. This mechanism, together with sequence acquisition, helps achieve a high maximum continuous event rate in spite of interrupts due to the computer operating system. The maximum continuous event rate is the maximum value of the trigger frequency that can be accepted without the loss of any event. Note that this mode is available for internal memory only on single modules (no AS bus) and does not work for all cases of sampling rate and channel combination. It does not work if the 'Start on Trigger' mode of acquisition is selected. It will work for the maximum sampling rate. This mode is available for the DC222, DC252, and DC282 only. Please contact us if you have any doubts.



3.3.5. Timing

A crystal-controlled timebase is used to clock the ADC system of the digitizers. The timebase accuracy is guaranteed to be better than 2 ppm . The digitizers also include a built-in Trigger Time Interpolator (TTI) that measures the time from the trigger point to the first sample point. This information is essential for determining the precise relation between the trigger or other event of interest and the digitized samples of the signal. The TTI resolution is ~13 ps.

3.3.6. Timebase Range

The timebase range defines the time period over which data is being acquired. For example, the DC282 has a standard acquisition memory of 256 Kpoints and maximum sampling rate of 2 GS/s. Therefore, at the maximum sampling rate, the digitizer can record a signal over a timebase range of up to 130 µs (approx. 260,000 points * 0.5 ns/point). The timebase range can be adjusted by varying the amount of acquisition memory or the sampling rate of the digitizer.

3.3.7. Combining channels

The DC152, DC252, and DC282 digitizers offer the possibility of combining the converters (and their memories) from two or four channels to analyze a single input channel. With this feature the maximum sampling rate and the maximum amount of acquisition memory can be doubled or quadrupled if all of the input channels are not of immediate interest.

3.3.8. Data Readout

The DC222, DC252, and DC282 digitizers are capable of handling 64-bit 66 MHz readout. Such operation requires a single board computer or a cPCI interface + PC supporting such functionality. All devices in the crate must be capable of 66 MHz readout. The crate may also have to be set so as to allow this mode; this means M66EN must be open and V(I/O) should be 3.3 V. Acqiris CC103, CC105, and CC108 crates have toggle switches to select such use. However, only the CC103 and CC105 backplanes support this functionality. 66 MHz readout cannot be done in larger crates such as the Acqiris CC121. The actual transfer speed obtainable will depend on many other system characteristics.

3.4. Trigger

Normally the trigger settings applied to the digitizer are used to determine the time at which the device will stop acquiring data. They are also capable of a 'Start on Trigger' mode of acquisition (see the Programmer's Guide for further details). The various trigger settings are outlined below.

3.4.1. Trigger Source

The trigger source can be a signal applied to either an Input Channel (internal triggering) or the External Trigger Input. A standardized trigger in signal can also be routed via the PXI Bus Star Trigger line. Because of their high bandwidth HF front ends do not allow internal triggering.

The digitizers provide a separate front panel input that can be used as an External Trigger Input. The External Input provides a fully functional trigger circuit with selectable coupling, level and slope as for the Internal Triggering source. The external trigger has a fixed 50 Ω termination impedance. It allows optional BW limiter selections of 20, 200, or 700 MHz. The external trigger circuit has diode protection against overload. In all 50 Ω cases a ±5 V limit on trigger signals should be respected, although somewhat higher voltages for short time periods will not damage the unit.

3.4.2. Trigger Coupling

Trigger coupling is used to select the coupling mode applied to the input of the trigger circuitry. Modes available include AC LF Reject and DC. The AC LF Reject mode couples signals capacitively and removes the input signal's DC component and signals below 50 Hz. DC mode allows all signal components to be passed through to the trigger circuit. The HF Reject mode removes signal components above 50 KHz.

3.4.3. Trigger Level

The trigger level specifies the voltage at which the selected trigger source will produce a valid trigger. The trigger level is defined as a set voltage. Using the internal trigger, the level is set with respect to the midpoint voltage (V_m= – Offset voltage) of the digitizer's vertical scale. Internal trigger level settings (expressed in %) must be within V_m ± 0.5 FS, where FS is the channel Full Scale. All trigger circuits have sensitivity levels that must be exceeded in order for reliable triggering to occur.

The digitizers allow the user to choose the external trigger Full Scale from the set of values 0.5, 1.0, 2.0 or 5.0 V. The external trigger level can then be set to values in the range ± 0.5 FS.

The digitizers will trigger on signals with a peak-peak amplitude > 15% FS from DC to their bandwidth limit.

3.4.4. Edge Trigger Slope

The trigger slope defines which one of the two possible transitions will be used to initiate the trigger when it passes through the specified trigger level. Positive slope indicates that the signal is transitioning from a lower voltage to a higher voltage. Negative slope indicates the signal is transitioning from a higher voltage to a lower voltage.

3.4.5. Window Trigger

The digitizers implement a Window trigger. Two trigger level thresholds are used to define the desired range. The trigger can then be chosen to occur either when the signal exits or enters the window range. This mode can be thought of as the appropriate OR of two edge triggers of opposite slope.

3.4.6. HF Trigger

The digitizers implement an HF trigger that allows triggers to be reliably accepted at rates above ~ 1 GHz. In this mode, triggers occur on every fourth positive edge. The window trigger mode is not available.

3.4.7. Spike Stretcher

The trigger circuit also has a Spike Stretcher mode which ensures that even very short pulses are capable of generating triggers. This mode is useful if the time interval during which the trigger signal satisfies the threshold condition is less than 0.5 ns and the trigger frequency is less than 10 MHz. The trigger slope is positive in this mode.

3.4.8. Multi-source Trigger

The 10-bit digitizer family permits triggers that require a pattern condition including combinations of the trigger channels and the external trigger. The trigger condition defined above, on each of the inputs, defines the TRUE/FALSE state of each input. These states can be logically combined with AND, OR, NAND, or NOR to define the overall trigger condition. Potential triggers can then occur on the FALSE to TRUE transitions of the combined signal.

There is a small (~ns) delay between the times at which two simultaneous inputs arrive at the logical element that defines the overall trigger condition. If necessary, this must be corrected for by cable delay on the external input; the delay will depend on the overall configuration and therefore must be determined by the user.

3.4.9. Pre- and Post-Trigger Delay

To increase trigger flexibility a pre- or post-trigger delay can be applied to the trigger position.

The amount of pre-trigger delay can be adjusted between 0 and 100% of the acquisition time window (i.e. sampling interval x number of samples), whereas the post-trigger delay can be adjusted within the time interval corresponding to $[0,\ 2^{35} - 1$ samples].

Pre- or post-trigger delays are just different aspects of the same trigger positioning parameter:

- The condition of 100% pre-trigger indicates that all data points are acquired prior to the trigger, i.e. the trigger point is at the **end** of the acquired waveform.
- The condition of 0% pre-trigger (which is identical to a post-trigger of 0) indicates that all data points are acquired immediately after the trigger, i.e. the trigger point is at the **beginning** of the acquired waveform.
- The condition of a non-zero post-trigger delay indicates that the data points are acquired after the trigger occurs, at a time that corresponds to the post-trigger delay, i.e. the trigger point is **before** the acquired waveform.

The digitizer hardware accepts pre- and post-trigger adjustments in increments of 16 samples. By definition post-trigger settings are a positive number and pre-trigger settings are a negative number.

Thus it is only natural that the software drivers treat pre- and post-trigger delays as a single parameter in seconds that can vary between *–nbrSamples * samplingInterval* (100% pre-trigger) and *+maxPostTrigSamples * samplingInterval* (max post-trigger). Since the Acqiris software drivers provide very accurate trigger position information upon waveform readout, the accepted resolution of the user-requested pre-/post-trigger delay is much better than 16 samples. For more details, refer to the Programmer's Guide.

3.4.10. Trigger Status

The front panel includes a tri-color LED indicator to show the status of the trigger. When the LED is green it indicates the trigger is armed and waiting for a valid trigger to occur. Red indicates that the trigger has occurred, the

acquisition is complete and the data is waiting to be readout. The user can override the default functions and program the LED color in an application-specific manner.

3.5. External Clock and Reference

For applications where the user wants to replace the internal clock of the digitizer and drive the ADC with an external source, either an External Clock or an External Reference signal can be used. The Clock or Reference signals can be entered into the digitizer by the dedicated MMCX. In addition, the PXI Bus 10 MHz system clock signal (PXI_CLK10) can be used as the reference.

The External Clock must be continuously present for use by these digitizers. The input signal must have a frequency between 200 MHz and 2 GHz and a minimum amplitude of at least 0.5 V peak to peak into 50 Ω at the front of the digitizer. The transitions of the clock are defined with the aid of a threshold that is user selectable in the range [-3.0 V, 3.0 V]. The signals should not exceed ±5 V amplitude. For a detailed discussion on the programmed use of the external clock, refer to the Programmer's Guide.

For applications that require greater timing precision and long-term stability than is obtainable from the internal clock, a 10 MHz Reference signal can be used. The External Reference is nominally at 10 MHz. However, frequencies in the range [9.97 MHz, 10.03 MHz] will be accepted. If you do this you may need to correct for the difference in your application since the digitizer and the driver have no way to know about such deviations. The amplitude and threshold conditions, for an External Reference, are the same as for the External Clock. If synchronization between several digitizers is required, the reference signal should be applied to all of them.

3.6. Internal Calibration

The software drivers supplied include calibration functions for the timing, gain and offset settings, which can be executed upon user request. The digitizers are never calibrated in an "automatic" way, i.e. as a side effect of another operation. This ensures programmers have full control of all calibrations performed through software in order to maintain proper event synchronization within automated test applications.

The digitizers include a high precision voltage source and a 16-bit DAC, used to determine the input voltage and offset calibration.

For accurate time and voltage measurements it is recommended to perform a calibration once the module has attained a stable operating temperature (usually reached within 15 minutes of digitizer operation after power on). Further calibration should not be necessary unless temperature variations occur.

A full internal calibration of a digitizer can be very time consuming (> 100 s/digitizer), in particular for the HZ models. Therefore, several other options are available. They are documented in the **Programmer's Reference Manual**. A program can always be started with the digitizer in an uncalibrated state and data taken can be used for many kinds of testing. However, as soon as good data respecting the specifications of the instrument is required a calibration of at least the current acquisition state is needed. The full internal calibration has the advantage that it generates the calibration constants needed for any possible configuration of the instrument; its disadvantage is the time taken. If a more selective calibration is done it will allow the generation of good data in the current acquisition state. This calibration will remain useable whenever that acquisition state is used again for as long as the temperature of the instrument does not change significantly. A fast calibration of a channel in a configuration can be done in around a second. Many applications can save time by only performing calibration for the configurations that will actually be used. Calibration can usually be performed with signals present at the channel, external, and clock inputs. However, if the calibration is found to be unreliable, as shown by a calibration failure status, it may be necessary to remove such signals.

An application program will close devices if it exits normally. When a 10-bit digitizer is closed in this way its power consumption will be reduced. This has the consequence that if another application program is started later an appropriate warm-up period may have to be respected before a calibration is called for and full performance expected.

3.7. Factory Calibration

Whilst the Internal Calibration function will provide a good degree of confidence that your instrument is operating within its specifications on a day-to-day basis, Agilent recommends that each instrument undergoes a Factory Calibration at least annually to ensure that it remains within the specified performances.

Factory Calibration is the process of measuring the actual performance of an instrument-under-test using lab instruments that in turn have significantly better performance than the instrument-under-test. Lab instrument performance must be traceable to the International System (SI) Units via a national metrology institute (NIST, NPL, NRC, PTB, CENAM, INMETRO, BIPM, etc.)

The measured performance is then compared to published data sheet specifications. Agilent Technologies tests the performance corresponding to all data sheet specifications, for all installed options, every time. If we observe your instrument to be out-of-specification, we always adjust it and re-test before we return it to you.

For more information, or to return your instrument to Agilent for calibration please see
www.agilent.com/find/calibration

3.8. AS bus 2

The digitizers may be used in applications that require many data acquisition channels. In such cases it is possible to use more than one digitizer in a standard CompactPCI/PXI crate. Each DC Series 10-bit digitizer includes AS bus 2, a proprietary high bandwidth auto-synchronous bus system that allows multiple digitizers to work together synchronously.

AS bus 2 distributes both the clock and trigger signals along a plug-in front panel bus, between all the digitizers that participate in the system. It allows any digitizer to act as the trigger source and any other digitizer to act as the clock source (acquisition master), enabling all the digitizers to be clocked at the same time. Synchronizing the clock signals between the devices improves the accuracy of cross-channel measurements and is essential for accurate time correlation between signals on different channels.

AS bus 2 is intended to connect modules of the ***same type***, i.e. of the same model number, although some exceptions to this rule might be possible. If modules with the same model number, but different memory length options, are connected only the shortest memory length can be used.

The AS bus 2 connector is located on the front panel of each module. Bridges are used to connect adjacent modules for synchronization. An AS bus 2 multi-instrument is activated through software by a function call. Up to 5 6U modules, or 3 3U modules, may be synchronized with the AS bus 2. Consequently no more than 4 adjacent AS bus 2 bridges should be installed. More detailed information and the commands required to set up the AS bus 2 clock and trigger distribution are included in the Programmer's Guide and Reference manuals.

3.8. Special Front Panel Inputs and Controls

The following front panel connectors are available:

Connector	Function
MMCX CLK IN	50 Ω External Reference or External Clock Input
MMCX I/O A	User configurable (see below)
MMCX TR OUT	Signal occurs after an accepted TRIGGER.
MMCX I/O B	User configurable (see below)

3.8.1. Multi-purpose Input & Outputs (I/O A, I/O B)

The I/O A or I/O B may be used as any of the functions shown in the table below:

Function	Direction	Description
Enable Trigger	Input	
10 MHz Ref Clock	Output	To ensure good rise time characteristics the output impedance is 50 Ω This signal can be used as an input to 1 (or 2 using a T split) CLK IN connectors. Note: This signal is the internal 10 MHz and is not available if the External Reference Clock is in use.
Acquisition skipping to next segment	Output	
Acquisition is active	Output	Indicates that the acquisition is currently running.
Trigger is armed	Output	Indicates that the trigger is armed and waiting for a valid trigger event.

To ensure proper operation of the segment recording of hardware markers, the logical state of MCX I/O A, MCX I/O B inputs, the input must be stable for a time interval starting 30 ns before the trigger and continuing until 30 ns after it. This implies that the HF Reject trigger coupling should not be used. If the individual inputs are not in the disable state the corresponding bits will be useless.

The I/O A and I/O B signals are 3.3 V CMOS compatible, with the following levels:

Direction	Low Level	High Level
Input	<0.8 V	>2.0 to 3.45 V
Output	0 to 0.8 V	1.7 to 3.3 V

An unconnected input will be pulled high. The high level output will typically give 0.8 V into 50 Ω.

3.8.2. TRIGOUT

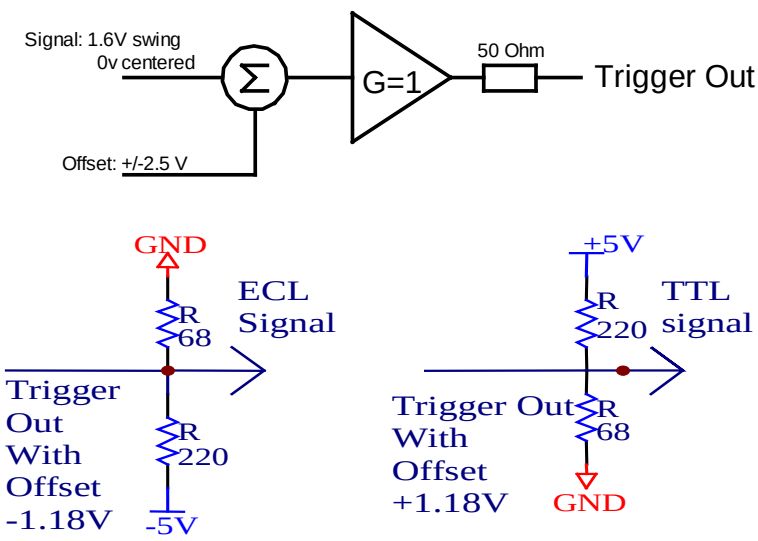
The TRIGOUT Signal occurs after an accepted TRIGGER. It can be chosen to be either synchronous to the Trigger IN or synchronous to the acquisition Clock and, in this case, can be used to trigger events synchronously to the acquisition clock.

3.9. External Trigger Output

When the digitizer is ready to be triggered and a valid trigger signal occurs, a trigger output is generated for external use. It is always available on the Front Panel Trigger Out MMCX connector. The pulse ends when the data acquisition for the trigger in question is complete.

⚠ ***NOTE:*** *The External Trigger Output functionality is implemented in the hardware. No Trigger Out signal occurs for software-generated triggers such as those of the AUTO mode of AcqirisLive or through the use of the function* ***AcqrsD1_forceTrigger***. However, ***AcqrsD1_forceTriggerEx*** does generate the signal.

Trigger Output Block diagram:



The output swing is 1.6 V (± 0.8 V) when unloaded and 0.8 V when terminated on 50 Ω. The rise and fall times are 2.5 ns typical. The offset can be adjusted, by software control in the range [–2.3 V, +2.3 V] unloaded, or [-1.15 V, +1.15 V] into 50 Ω. The maximum output current capability is ± 15 mA. As the output is retro-terminated, it is possible to drive a 50 Ω line unterminated (HiZ) without loss of performance.

For a TTL compatible signal, set the offset to 1.0 V and the swing at destination will be +0.2 to +1.8 V.

For an ECL compatible signal, terminated on 50 Ω to –1.2 V, set the offset to –1.2 V and the output will be in the range [–0.8 V, –1.6 V]).

Alternatively, to reduce the current drawn from the digitizer, the terminations shown here can be used:

A standardized trigger out signal can also be routed to the PXI Bus Star Trigger line.

3.10. Electrical, Environmental and Physical Specifications

3.10.1. Electrical

	PCI Rev.	Max. Power Consumption (W)	Current Requirements (A)			
Model			**+12 V**	**+5 V**	**+3.3 V**	**-12 V**
DC122 Default Memory	2.2	34	0.12	3.8	3.9	0.015
DC122 Optional Memory	2.2	43	0.12	3.8	6.8	0.015
DC152 Default Memory	2.2	35	0.12	4.0	3.9	0.015
DC152 Optional Memory	2.2	44	0.12	4.0	6.8	0.015
DC2x2 Default Memory	2.2	65	0.1	7.4	7.9	0.033
DC2x2 Optional Memory	2.2	84	0.1	7.4	13.8	0.033

The power and current values have been increased by 10% to take into account possible variations of the crate voltages and signal dependent effects. The current requirements of the DC222 and DC252 models are only slightly lower than the DC282 case. The differences between the different front end options are also small; a single Standard or HZ channel pulls ~0.3 A @ +5 V.

The electrical requirements shown above can impose loading limitations in the cPCI crate. In the extreme case where a PC503 processor is present in an Acqiris crate the following limits apply:

Crate	**DC1x2 all models**	**DC2x2 Default Memory**	**DC2x2 Optional Memory**
CC103	None	None	None
CC105	None	None	3
CC108 normal and low power	None	4	3
CC108-600	None	6	3
CC108-800	None	None	None
CC121	None	14	8

If a third party crate is being used please check that the current drawn at 3.3 V does not sag below the effective PCI allowed tolerance at the beginning of the acquisition. Acqiris 3-, 5-, and 8-slot crates should be modified at the factory for use with these modules.

The digitizers can use the PCI Bus at 32-bit − 33 MHz, all models, or at 64-bit − 66 MHz, DC2x2 only . The latter allows data to be transferred with DMA at average rates up to 350 MB/s with appropriate hardware under Windows and Linux. Otherwise, the DMA transfer rates are limited to ~100 MB/s. The CompactPCI modules are compatible for either V I/O = 3.3 V or 5V.

3.10.2. Environmental and Physical

The modules have a Declaration of Conformity according to ISO/IEC Guide 22 and EN45014 and **CE** Marks of Compliance.

The front panels of the CompactPCI modules are in compliance with the IEEE 1101.10 standard.

Operating Temperature

0° to 40°C

The above values are for the ambient temperature of the room (or equivalent) where the CompactPCI crate is located. The temperature as measured on the board may well be significantly higher. On-board temperatures above 60°C should be avoided.

Relative Humidity

5 to 95% (non-condensing)

Dimensions

The DC122 and DC152 conform to the 3U CompactPCI standard (100 mm × 160 mm × 20 mm). All other DC modules conform to the 6U CompactPCI standard (233 mm × 160 mm × 20 mm).

EMC Immunity & Emissions

Complies with European EMC Directive 2004/108/EC
• IEC/EN 61326-2-1
• CISPR Pub 11 Group 1, class A
• AS/NZS CISPR 11
• ICES/NMB-001

This ISM device complies with Canadian ICES-001.
Cet appareil ISM est conforme à la norme NMB-001 du Canada.

Required Airflow

> 2 m/s in situ

4. Soft Front Panel (SFP) Applications

The Agilent SFP Applications (previously called AcqirisLive) are intended to verify the functionality of the card and to serve as an easy to use and convenient program for capturing, displaying, and archiving captured data.

This program uses the AgMD1 and other associated drivers to control any supported digitizers. It is installed at the same time as those drivers.

4.1. SFP Versions

There are currently two versions of the SFP application.

The SFP 1.x version is gradually being phased out by the introduction of the SFP version 5. However at this point in time the SFP 5 application does not fully support all products, modes of operation or features that are supported by the SFP 1.x, and so the user must decide which SFP to use depending on their application.

4.1.1. SFP 5.x

This newer version of the SFP application supports all products which are covered by the MD1 driver. New features, and replication of features which currently exist in the older SFP 1.x will be introduced progressively into the 5.x version.

This version supports:

- All Agilent U10xx (8, 10 & 12-bit Digitizers).
- All Agilent Mxxxx series Digitizers. (Except M9202A in DDC mode)
- DGS, DCT, SAR/SSR, Peak TDC modes of operation.

4.1.2. SFP 1.x

This application which was previously known as 'AcqirisLive' contains some features which have not yet been implemented in the SFP 5 application. Users who prefer this application or wish to use one of the features below may continue to do so.

This version is required currently if you wish to use any of the following instruments, or features:

- Using M9202A in DDC mode.
- U1082A, AP100 or AP200 Averagers.
- Using multiple modules at the same time.

4.2. SFP Documentation

Information on the operation of both of the above SFP versions may be found in the ‘AgMD1 Digitizers – User Guide & Soft Front Panel Help’. This is an HTML Help system (.chm) which may be found on the CD supplied with your product, or from the windows ‘Start Menu’ after you have installed your product software. Look under – ***Start > All Programs > Agilent > MD1 > ‘MD1 Help’***

5. Appendix A: U1093A-AS5 AS bus 2 for CompactPCI/PXI Digitizers

Specification and User Instructions

SPECIFICATIONS :

AS bus 2 Bridges allow the connection and synchronization of up to 5 identical 10-bit CompactPCI U1065A (DC222, DC252, DC282) or 3 identical PXI digitizers U1062A (DC122, DC152).

Clock synchronization accuracy : ±500ps.

USER INSTRUCTIONS :

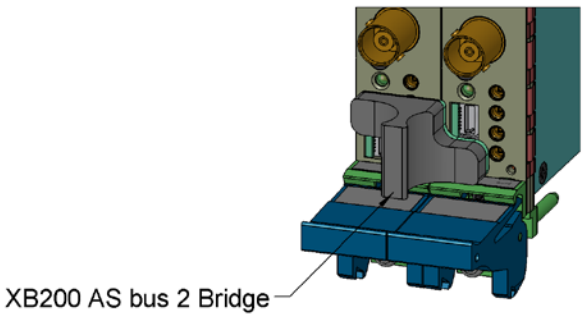
Bridges can be installed/removed on units when they are powered. An application using the digitizers must be restarted after such changes are made.

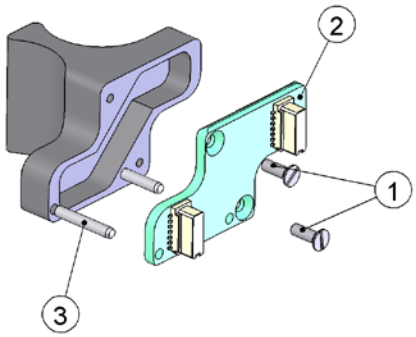
Install/Remove the U1093A-AS5 XB200 AS bus 2 Bridges as follows :

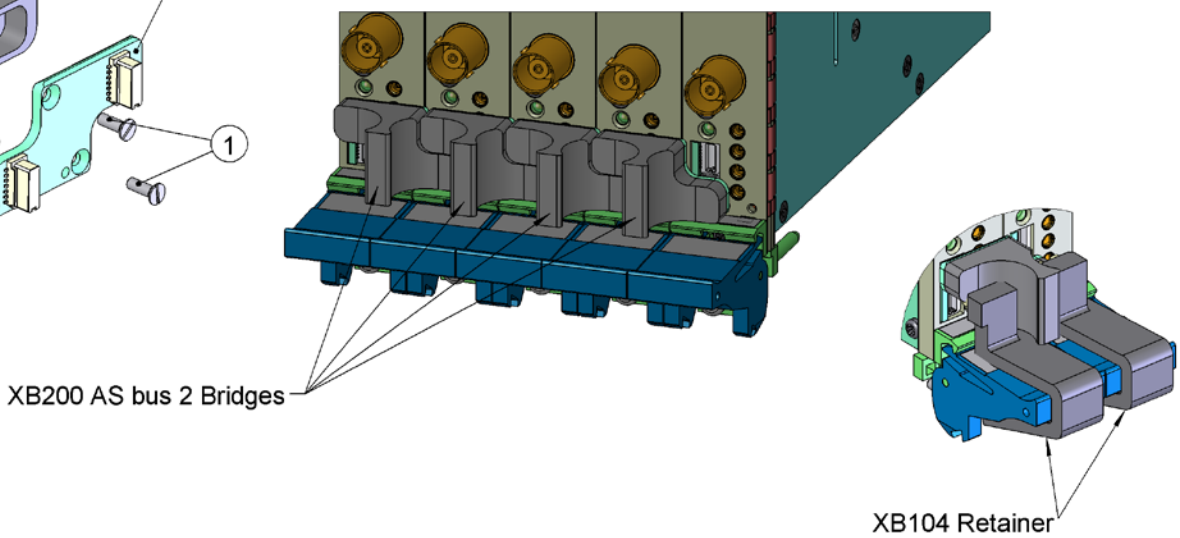
- Make sure that the screws securing each of the modules to the crate are not completely tightened.
- Before inserting the XB200, manually adjust any difference in the module separation, such that the distance between the center of the connnectors corresponds to that of the XB200.
- Carefully insert/remove the XB200 bridges between each pair of modules. Force should not be required.
- Tighten the screws of each of the modules.
- If desired, add an U1093A-AS7 XB104 Retainer on each handle to secure the AS bus 2 bridge against vibration.
  It clicks into place when fully inserted. It can be easily removed by pulling on the lower half of the Retainer while sliding it off.

Modification of XB200 AS bus 2 Bridges for use on older modules.
An earlier version of the Bridge was foreseen with only one positioning pin. If needed,

- Remove the two screws 1)
- Remove the Printed Circuit Board 2)
- Pull the positioning pin 3)
- Reassemble the Bridge





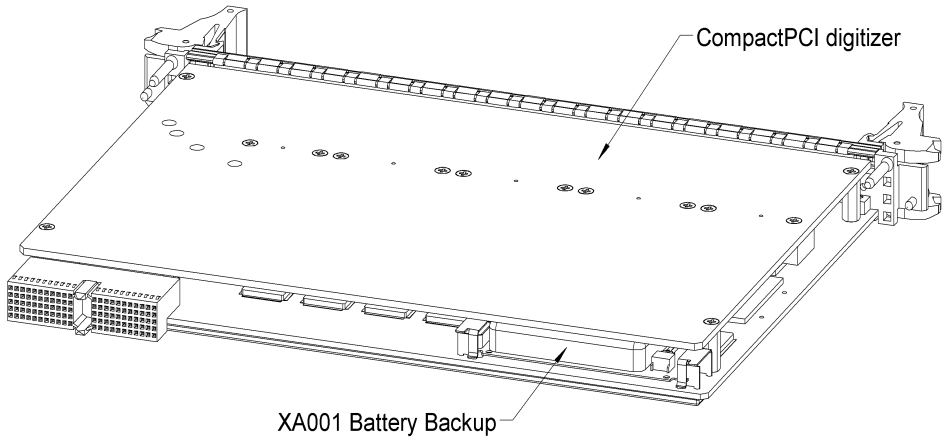


6. Appendix B: XA001 Battery Backup for CompactPCI Digitizers

Specification and Assembly Instructions - BB1 Option

SPECIFICATIONS :

Please refer to the user manual for more detailed information on the use of the battery backup.
Time to charge the battery : <2.5 h (digitizer powered)
Backup duration time : without long memory option : >120 h
with long memory option : >12 h
Lifetime : 75% of battery capacity after 500 cycles



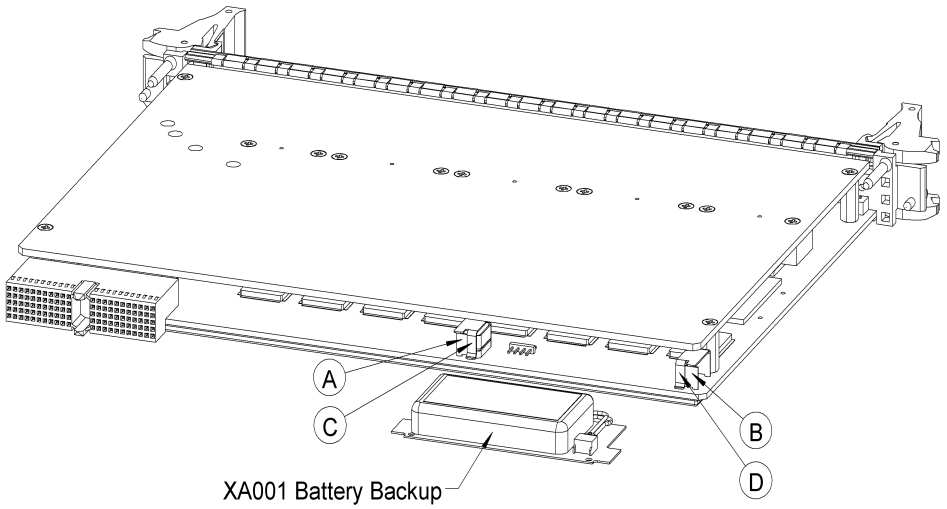
ATTENTION :

The CompactPCI digitizer must always been powered off before either introducing or removing the battery backup and care must be taken in order to avoid electrostatic discharges.

The following steps are necessary to install the battery backup XA001 into a CompactPCI digitizer :

1. Position the battery backup between the guides "A" and "B" insuring that the orientation matches the figure below.
2. Lift the two strips "C" and "D" in order to introduce the circuit board of the battery into the guides "A" and "B".
3. Push the battery in the direction of the card until it hits the stop blocks and ensure that the strips "C" and "D" are correctly and securely attached.

Proceed in the reverse order to remove the battery.



7. Appendix C: U1092A-HVB XA100 BNC Input Overvoltage Protection

Specifications and User Instructions

The XA100 Acqiris option contain two elements :
- 3dB BNC Attenuator
- 90V BNC Spark Gap

The XA100 overvoltage protection kit allows the digitizers with 50 Ohm only input (without high impedance input) to withstand a high voltage surge of up to 5 kV.

XA100 SPECIFICATIONS :

- Frequency range : DC to 1GHz
- Input impedance : 50 Ohm
- Attenuation : 3 dB
- VSWR, DC to 1GHz : < 1.25
- Impulse discharge current (8/20 us pulse) : 10 kA
- Weight : 60 g
- Length : 85 mm

ATTENTION :

- BOTH the 90V spark gap and the 3dB attenuator MUST be used in order to absorb very high current.

- In order to limit the input current, the attenuator MUST be inserted between the spark gap and the input of the module, as shown in the figure below.